GENERAL ORGANIC CHEMISTRY

SOLUTION TO ASSIGNMENT PROBLEMS (SUBJECTIVE)

Level – I

SHORT ANSWER TYPE QUESTIONS

1. $(CH_3)_3\overset{+}{C} > CH_3CH_2\overset{+}{C}HCH_3 > CH_3CH_2CH_2\overset{+}{C}H_2 > CH_3CH_2\overset{+}{C}H_2 > CH_3\overset{+}{C}H_2 > \overset{+}{C}H_3$

2. $(C_6H_5)_3C^{\bullet} > C_6H_5CH_2^{\bullet} > (CH_3)_3C^{\bullet} > CH_3CH_2^{\bullet} > CH_3^{\bullet}$

3. II > I > III

4. III > II > IV > I

5. $H_2O < CH_3OH < OH^- < CH_3O^-$

6. $CH_3F < CH_3Cl < CH_3Br < CH_3I$

7. $CH_3CHO < CH_3COCH_3 < CH_3COCH_2CHO < CH_3COCH_2COCH_3$

8. $(CH_3)_2CHCOOH < CH_3CH_2COOH < CH_3COOH < ClCH_2CH_2COOH < ClCH_2COOH$

9. (a) C(3°) > A(2°) > B(1°)
   (b) B(3°) > C (2°) > A(1°)

10. (a) MeX > RCH_2X > R_2CHX > R_3CX
    (b) A(n-) > D(iso-) > C(sec-) > B(tert-)

11. FILL IN THE BLANKS

(i) less

(ii) more

(iii) two

(iv) sp^3

(v) O–H

(vi) $sp–sp^2$

(vii) delocalization

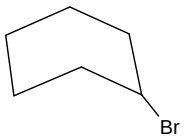
(viii) electrophile, nucleophile

(ix) temporary, complete transfer, multiple

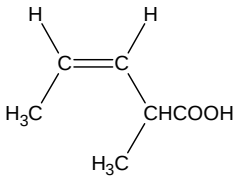
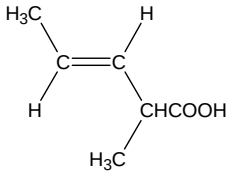
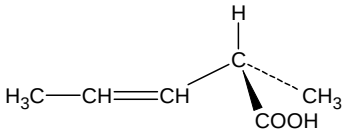
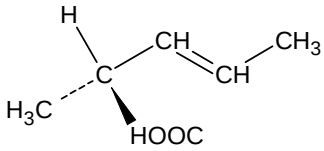
(x) σ -π, π-π, n - π

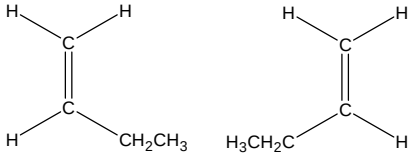
EXPLANATORY QUESTIONS

12.

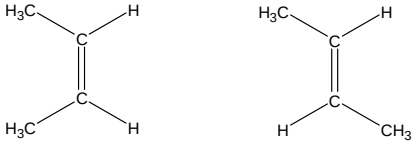


Will have maximum rate of hydrolysis, as this carbocation will be more stable than (C), as well as leaving group is better than (A).

13. (i) 
(ii) 
(iii) 
(iv) 

14. 

In 1-butene, both structures are identical as they can be superimposed on each other.



In 2-butene, both structures are different and cannot be superimposed on each other.

15. Total number of structural isomers = 7

$CH_3—CH_2CH_2CH_2—OH$ (i)

$CH_3—CH(CH_3)—CH_2OH$ (ii)

$CH_3—CH(OH)—CH_2CH_3$ (iii)

$H_3C—C(CH_3)(CH_3)—OH$ (Iv)

$CH_3CH_2—O—CH_2CH_3$ (v)

$CH_3—O—CH_2—CH_2—CH_3$ (vi)

$CH_3—O—CH(CH_3)—CH_3$ (vii)

16. $C_4H_{10}O$ can represent alcohol and ether. Ether shows metamerism, ether and alcohol shows functional isomerism and alcohols show position isomerism.

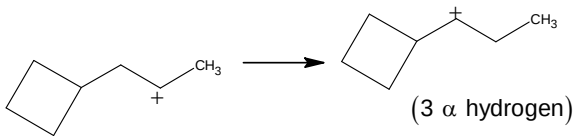
17. Since S is larger than O, the charge density of negative charge is less, hence CH_3S^- is weaker base and its conjugate acid CH_3SH is stronger than CH_3OH.

18. Vinyl < Methyl <1° < 2°< 3° < Allyl

19. 2-Butene has two dissimilar groups attached to each unsaturated carbon, 2-butyne is linear so it cannot have geometrical isomer.

Level – II

1. Write the reason correctly



(5 α hydrogen) (3 α hydrogen)

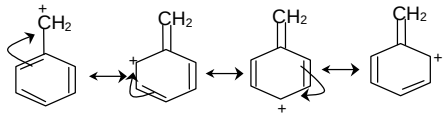
So, ring will not expand.

2. First requirement for a compound to show optical isomerism is that it should have at least one asymmetric carbon atom (the carbon marked as * is asymmetric). Therefore, the above compound having marked * are asymmetric. So, the above compound having one asymmetric carbon atom will show optical isomerism.
First requirement for a compound to show geometrical isomerism is it should have hindered rotation (the above compound has one double bond). Second requirement is no two same groups should be attached to double bonded carbon atoms (the above compound has two $-CH_3$ groups attached to double bond). Therefore, the compound does not fulfill the second requirement, hence does not exist as cis and trans isomers.

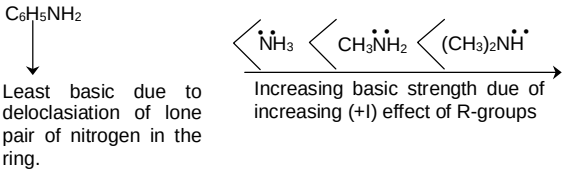
3. In aliphatic amines lone pair lies in sp^3 hybridized nitrogen whereas in pyridine lone pair lies in sp^2hybridized nitrogen. So, in pyridine nitrogen atom has more hold over this lone pair of electrons, decreasing its availability.

4. (i) E (ii) Z

5. Benzyl carbonium ion is more stable due to resonance

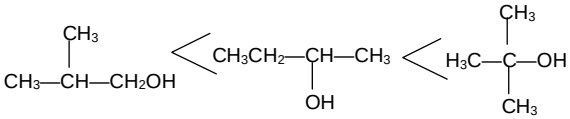


6. Order of basic strength is as follows:

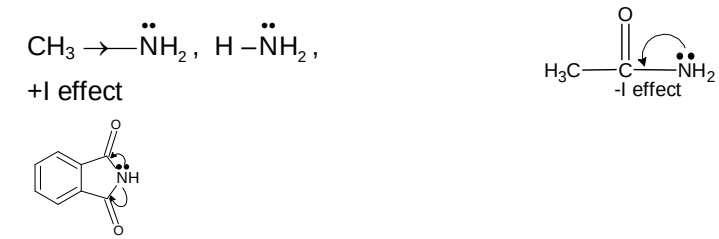


7. Due to more covalent bonds, octet of every atom in $R—C\equiv O^+$ is complete.

8.



9. II > I > III > IV



10. One of the nitro group becomes perpendicular to phenyl ring due to steric hindrance and stop participating in the resonance.